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Liebherr-Mischtechnik GmbH
Fahrmischer
Betonmischanlagen
Mischersysteme
Steuerungs- und Messsysteme
Betonrecycling

Unser Zeichen:	**Br**	Datum:	**3.2.17**
Prognose:	**AMC_01.xlsm**		
Anlagentyp:	**Mobilmix 2,5 A-R/DW**		
GA-/Projekt-Nr.:	**036-50952**		

Noise immission / Dust emission Forecast

NOISE IMMISSION FORECAST

in accordance with ISO 9613-2

We have calculated below the potential noise immissions which are expected to occur in the influence area of the planned mixing plant. The individual emissions from the main noise generators have been taken into account. The evaluation level is determined as continuous sound level over the following reference period:

Reference period = 24 h during the day

Sound propagation and outside protection are calculated in accordance with standardization. The emission values used as a basis (sound power level) were measured at plants of similar construction. The following noise emitters principally influencing sound propagation have been taken into account:

Single-point noise sources:	Batching process
	Weigher belt
	Wheel loader
	Gravel trucks when discharging load
	Cement silo trucks during pneumatic transfer
	Double schaft mixer
	Truck mixers during loading process
	Truck mixers during washing process
Linear noise sources:	Wheel loader during transport
	Gravel trucks during transport
	Cement silo trucks during transport
	Truck mixers during transport

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Single-point noise sources

In the immission forecast, stationary noise emitters are considered in idealised form as single-point noise sources:

Batching process:

The aggregates on the conveyor belt are thrown into the storage silo. Values are measured at a distance of 7 metres to the storage silos. Due to the all-round enclosure a noise protection level of 5 dB can be subtracted.

Weigher belt:

A bucket-type elevator is used to lift aggregates from the feed hopper to the storage silo and discharge them into it. Values were measured at a distance of 7 metres from the feed hopper. Due to the all-round enclosure a noise protection level of 5 dB can be subtracted.

Wheel loader:

Aggregates are transported from the storage compartment to the inline silos by wheel loaders. The measurements were taken from a distance of 7 m from the contour line of the wheel loader.

Gravel trucks when discharging load:

Washed aggregates delivered by trucks are discharged into storage containers or into the feed hopper. The influencing period is very short. Measurement of values was effected at a distance of 7 metres to the discharge point.

Cement silo trucks during pneumatic transfer:

Cement is supplied in silo trucks and blown into the cement silos by a compressor. In general, the vehicle engine is used to drive the compressor. Measurement of values was effected at a distance of 7 metres to the cement silo truck.

Double schaft mixer:

In the mixing plant, the mixer is considered the main noise emitter when mixing the aggregates, in particular when single gravel stones hit the outside wall of the mixer or become lodged and then scrape along between mixer arm and mixer wall. Measurement of values was effected at a distance of 7 metres to the mixer. Due to the all-round enclosure a noise protection level of 8 dB can be subtracted.

Truck mixers during loading process:

During the loading process the drum is rotating with nominal speed. The vehicle engine and the hydraulic system are the main noise emitters. Measurement of values was effected at a distance of 7 metres to the mixer.

Truck mixers during washing process:

To prevent setting of the residual concrete in the truck mixer, truck mixers need to be cleaned during the operation and after the end of the working shift by injecting water while the drum is rotating. Cleaning is effected at idle speed. Measurement of values was effected at a distance of 7 metres to the mixer.

Linear noise sources:

Mobile noise sources (traffic noise) are considered as linear noise sources.

Wheel loader during transport:

The wheel loader transports the aggregates from the storage dump to the charging hopper of the weigher belt. For this purpose wheel loaders must partly cross the plant premises and manoevring is required.

Gravel trucks during transport:

The truck transports the aggregates to the storage dump; for this purpose trucks must partly cross the plant premises and manoeuvring is required.

Cement silo trucks during transport:

Silo trucks deliver cement; for this purpose the trucks must partly cross the plant premises and manoeuvring is required.

Truck mixers during transport:

Truck mixers load concrete to transport it away from the plant; for this purpose the trucks must cross the plant premises of the plant and manoeuvring required.

Total evaluation level

The evaluation levels that were separately determined for each source of noise at the site of immission are energetically summed up. The total evaluation level is a value for average long-term noise immission at the site of immission for the relevant reference period.

Reference period = 24 h during the day

Immission point (IP)	Coordinates [m]			Total evaluation level $L_{r,total}$
	X	Y	Z	
IP 1	-50	0	4	71,5 dB(A)
IP 2	-100	0	4	61,3 dB(A)
IP 3	-200	0	4	53,8 dB(A)
IP 4	-300	0	4	49,7 dB(A)
IP 5	-800	0	4	39,3 dB(A)

Annex

Annex A: All data concerning the noise immission forecast are listed in Annex A. The table contains input values, interim calculation values and output data with reference to the single immission point.

Immission point: IP 1

Annex B: An overview over several immission sites with graduated colours in the noise immission map is shown in Annex B. From this map, noise propagation over a relevant area and possible local noise levels (evaluation levels) can be inferred.

DUST EMISSION FORECAST

Dust emission when filling cement silos

The cement silos are filled from the vehicles by means of an air compressor. The air enriched with cement dust is blown through the exhaust air filters on the cement silos. For the residual dust quantity at the filter outlet, see the guarantee for residual dust content.

Residual dust content < 10 mg/Nm3

Dust emission when filling the mixer

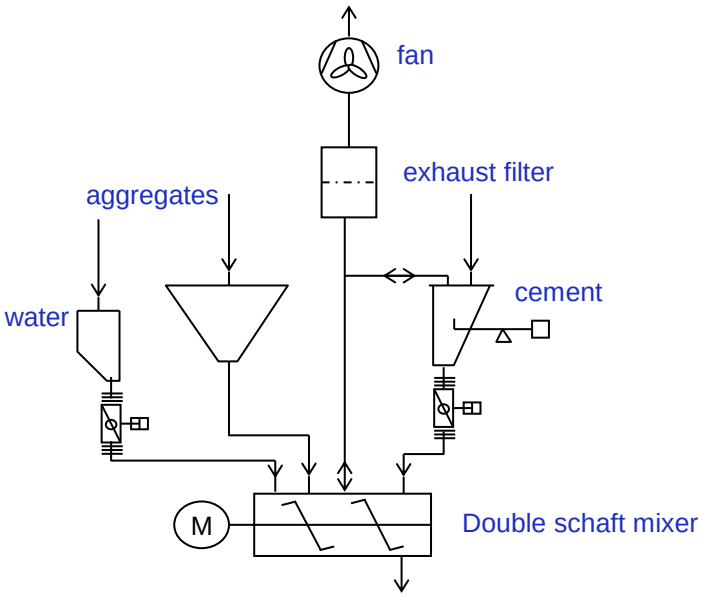
Aggregates with cement and water are mixed in the power mixer. During the time the mixer is filled with aggregates the air volume equivalent to the volume of the aggregates is displaced from mixer interior. This displaced air is drawn off via mixer exhaust filters with fan placed above mixer (see picture). Normally adding of aggregates is dust-free due to the moisture content of the aggregates stored.

Displaced air from the mixer interior when filling cement is led back into the upper part of the cement weighing hopper via an air equalizing hose (closed circle).

If in any case dust escapes from the closed system, most of the cement dust will be collected inside the plant lining. The quantity of cement dust emitted from the plant to the air is negligible.

The dust content of the mixer exhaust filter (pur gas side):

Residual dust content < 10 mg/Nm3



General Information

General description of the noise emission and the interpretation of it

The noise emission forecast estimates whether the mixing plant causes additional noise disturbances for local residents and how high they might be.
A comparison between the forecasted noise level and the corresponding emission points with limit values should serve as a basis for the permit.
Please note that the overall noise level depends greatly on the plant operators as well as on the overall plant operation.

Normen und Literatur

[1] Sechste Allgemeine Verwaltungsvorschrift zum Bundes-Immissionsschutzgesetz
(Technische Anleitung zum Schutz gegen Lärm – TA Lärm)
Vom 26. August 1998 (GMBl Nr. 26/1998 S. 503)

[2] Richtlinien für den Lärmschutz an Straßen (RLS-90) , Ausgabe 1990:02 & 2006:06

[3] ISO 9613-2:1996 Acoustics — Attenuation of sound during
propagation outdoors — Part 2

[4] DIN 18005-1:1987-05 Noise abatement in town planning – Part 1: Fundamentals and directions for planning

[5] DIN 18005-1 Beiblatt 1

[6] Technischer Bericht zur Untersuchung der Geräuschemissionen von Baumaschinen, Umweltplanung, Arbeits- und Umweltschutz Heft 247, Hessische Landesanstalt für Umwelt,1998

[7] VDI 2714:1988-01 Schallausbreitung im Freien

[8] Referenzmessungen, Liebherr Mischtechnik GmbH, Bad Schussenried

[9] Technische Datenblätter der Firmen Infastaub, LWK, WAM, SALT

Yours sincerely,

LIEBHERR - MISCHTECHNIK GMBH

i.A.

Immission forecast data

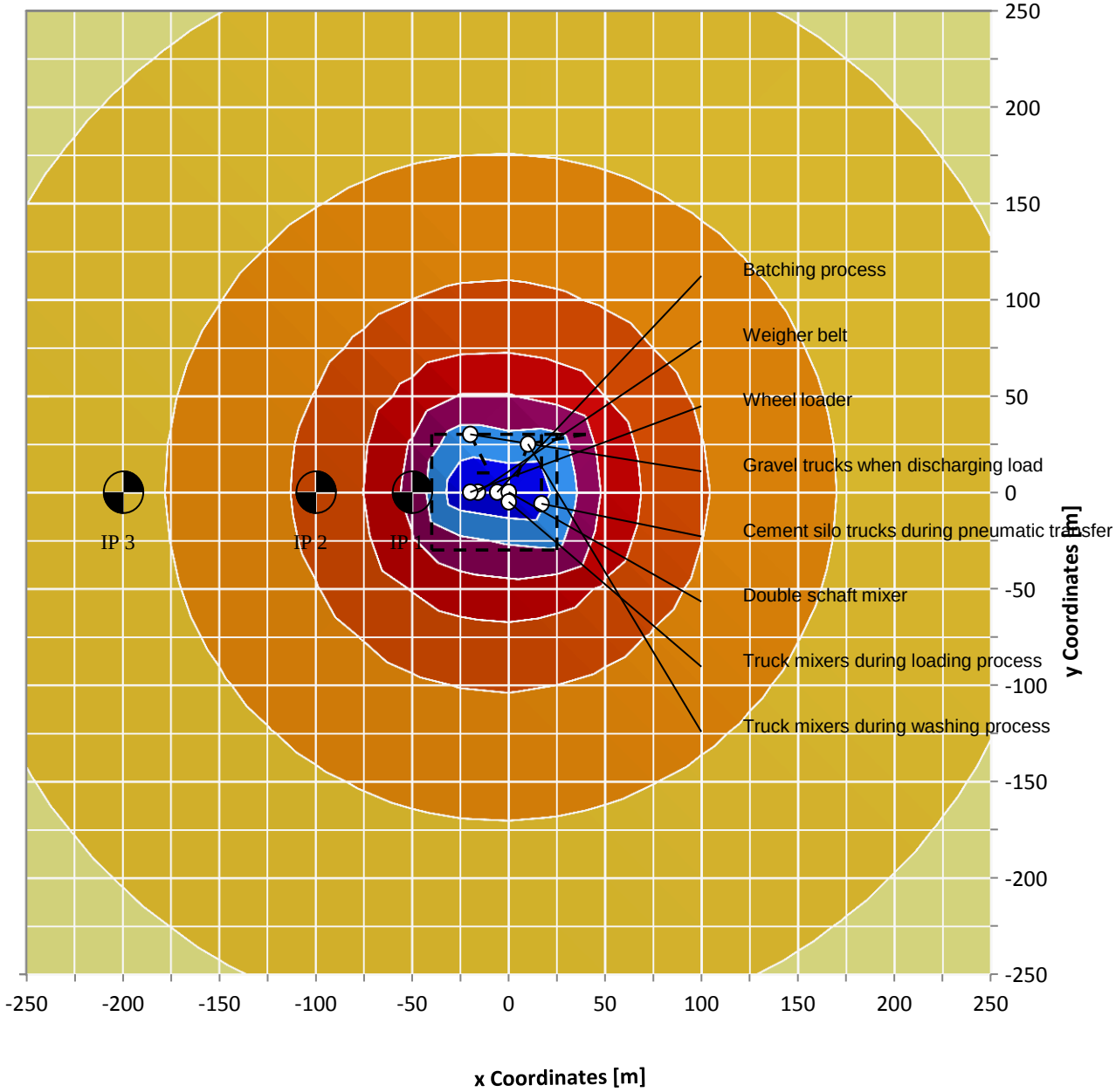
Sound propagation in accordance with ISO 9613-2

Basic data							Immission point
	Plant type	Mobilmix 2,5 A-R/DW	Reference time for evaluation level	24 h			IP 1
	Works/project No.	036-50952	Operation in idle time	0 h	Conrete volume per day	2400 m³	
	Date	03.02.2017	Supplement for idle times	0 dB	Proportion of aggregates by mass	2000 kg/m³	x [m]: -50
	File name	AMC_01.xlsm	Temperature	10 °C	Proportion of cement by mass	300 kg/m³	y [m]: 0
	Person in charge	H. Berner	Relative humidity of air	70 %			z [m]: 4

Single-point noise sources	Porportion concrete	Total 0	Output 0	Individual amount	Cycle time	Number of cycles	Time of operation	Type	Sound power level	Coordinates			sound reduction index	Directivity index	Solid angle coefficient	Shielding angle		Supplement			Evaluation level emission	Evaluation level immission
									L_W	x	y	z	R_W	D_I	K_0	Start	End	Idle	sound	impulse	Lr,Emission *	Lr,Immission
	%					-	h	-	dB(A)	m	m	m	dB(A)	dB(A)	dB(A)	°	°	dB	dB	dB	dB(A)	dB(A)
Batching process	100	2667 m³	150 kg/s				8,89	Stahl	103	-6	0	1	5	0	3			0,0	0	3	96,7	**53,6**
Weigher belt	100	2667 m³	200 kg/s				6,67	Normal	108	-16	0	2	5	0	3			0,0	0	3	100,4	**61,4**
Wheel loader	100	2667 m³		2 m³	15 s	1333	5,56	Laut	105	-20	0	3	0	0	3			0,0	0	6	104,6	**67,0**
Gravel trucks when discharging load	100	2667 m³		22 t	30 s	218	1,82	Normal	105	-20	30	1	0	0	3			0,0	0	6	99,8	**57,1**
Cement silo trucks during pneumatic tra	100	720 t	70 t/h	26 t		28	10,29	LKW	108	17	-6	1,5	0	0	3			0,0	0	0	104,3	**56,5**
Double schaft mixer	100	2400 m³	110 m³/h				21,82	DW 2,5	108	0	0	5	8	0	3			0,0	0	3	102,6	**59,8**
Truck mixers during loading process	100	2400 m³	110 m³/h	8 m³			21,82	Normal	103	0	-5	2	0	0	3			0,0	0	1,5	104,1	**59,9**
Truck mixers during washing process	100	Interim washing period			2 min	300	10,30		100	10	25	1,5	0	0	3			0,0	0	1,5	97,8	**50,4**
		Washing period after end of shift			6 min	3																
																				Summe Punktschallquellen:	**111,2**	**69,8**

Linear noise sources		Coordinates of nodal points									Porportion of concrete	Number of journeys	Traffic volume	Number of trucks	Speed 0	Up-hill gradients	Road surface	Sound power level per meter LW'	Supplement			Evaluation level emission	Evaluation level immission
		1	2	3	4	5	6	7	8	9									Idle	sound	impulse	Lr,Emission *	Lr,Immission
(DIN 18005)		m	m	m	m	m	m	m	m	m	%		vehic./h	%	km/h	%	dB	dB(A)	dB	dB	dB	dB(A)	dB(A)
Wheel loader	x	-20,0	-10,0	-20,0																			
during transport	y	30,0	10,0	10,0							100	2667	111,1	100	20	10	1	86,6	0,0	0	0	101,7	**60,4**
	z	1,5	1,5	1,5																			
Gravel trucks	x	25,0	-40,0	-40,0	25,0	25,0																	
during transport	y	30,0	30,0	-30,0	-30,0	30,0					100	436	18,2	100	20	10	1	78,7	0,0	0	0	102,7	**65,3**
	z	1,5	1,5	1,5	1,5	1,5																	
Cement silo trucks	x	40,0	17,0	17,0																			
during transport	y	30,0	30,0	-6,0							100	55	2,3	100	20	10	1	69,8	0,0	0	0	87,5	**38,7**
	z	1,5	1,5	1,5																			
Truck mixers	x	40,0	10,0	0,0																			
during transport	y	30,0	25,0	-5,0							100	600	25,0	100	20	10	1	80,1	0,0	0	0	98,0	**50,8**
	z	1,5	1,5	1,5																			
																					Summe Linienschallquellen	**106,1**	**66,6**
* Lr,Emission: reverence surface 1m²																					TotalEvaluation level emission Lr,Emission	**112,3**	
																					TotalEvaluation level immission Lr,Immission		**71,5**

Noise immission map



Informationen/Legende

Sound propagation in accordance with ISO 9613-2

rel. height above ground level: 4 m

TotalEvaluation level immission [dB(A)]

- 80-85
- 75-80
- 70-75
- 65-70
- 60-65
- 55-60
- 50-55
- 45-50
- 40-45
- 35-40
- 30-35

Plant type	Mobilmix 2,5 A-R/DW
Works/project No.	036-50952
Date	03.02.2017
File name	AMC_01.xlsm
Person in charge	H. Berner

- Single-point noise sources
- Linear noise sources
- Obstacles
- Copse/development
- reflection

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